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Patent of William Hutton of Sheffield, for a method of making sickles and Reaping Hooks.

Dated July, 1809.

These hooks have flat blades, all of one thickness, strengthened with backs attached to them, either by rivets, or by holding them tightly in a grove formed in each, in the same manner as the backs of the finer saws are constructed.

The following directions are given by the Patentee for forming these Hooks, "Take a piece of steel, hammer or roll it, to the proper thickness, then cut or pare it into the form of a sickle or reaping hook: then tooth the blade in the usual manner, if it is intended for a sickle; next harden the blade in the hardening mixture now used for saws, and give it a temper, or colour, according to the quality of the steel, of which it is made, then set and grind it. The back may be made and affixed to the blade in the following manner. Take a piece of iron or steel, hammer or draw it into the form of a back of a sickle, or hook, fit it to the blade; then drill holes through both it and the blade to correspond with each other, and fasten them together with rivets or screws.

The backs may be also made in the following manner; take a piece of iron or steel, roll, forge, hammer or cast it, to the proper thickness, and pare it to a breadth proper for the purpose you intend it, then double it by means of a vice, stamp, or fly press; then fasten the *tang* unto or into the back, either by welding or brazing; then hammer the back upon a stithy, or block of iron or steel, so that it may be flat and level, then close the edges nearly together, taking care to leave the back part more open than the edge, in order that it may form a spring for the purpose of holding itself fast to the blade, which done, put the blade into a vice, and force on the back through its nearly closed edges, with a hammer, or force the blade into the back by a wooden hammer, striking on the edge of the blade.

In this latter mode any number of rivets or screws thought proper, may be also added, to fasten the back to the blade more effectually.

Account of the Flat Roof of the cotton mill of Messrs. M'Crum, Leppers & Co. Belfast; and of the Composition used in constructing it, and other roofs, vallies, and Gutters in this vicinity.

The roof of the cotton mill lately erected by Messrs. M'Crum, Leppers & Co. near the poor house of Belfast, is quite flat. It is 196 feet long, and 38 feet broad, and has a part elevated about 5 inches above the rest, running all round it next the parapet, 6 feet broad, like a raised foot way; which forms a shallow pond in the middle, to hold a depth of about 4 inches of water; from which pipes descend to admit it to every story in the mill. The house for the steam engine, and for the steam boilers, which is a few feet detached from the other buildings, has also a flat roof; it is 40 feet long, and 34 feet broad, and is constructed so as to form a reservoir eleven inches deep to hold water.

The timber work of the roof, is the same as for the floors of the building; and its rafters have the same intervals between them as those of the floors; on these rafters battons two inches broad and one inch thick, were nailed half an inch apart from each other; and over the battons a coat of common mortar, containing equal quantities of slacked lime and of sharp sand, mixed with chopped hay, was laid half an inch thick. Slates cut in rectangles were placed with their edges close together upon the mortar, as flags or tiles are fixed in flooring.

When the mortar was dry, a coat from a quarter to three eighths of an inch thick was laid on over the slates, of a composition formed by about one part of tar, to two or three of chalk, according to the quality of the tar. The chalk was pounded exceedingly fine and boiled with the tar to a proper consistence, so as neither to be liable to crack when applied to use, or to be too soft; either of which extremes would be highly injurious. This coat of composition was spread out hot over the slates by heated iron tools, something like large smoothing irons, with long handles bent so as to be most convenient. On the following day, after putting on the first coat of composition, when the weather permitted, a second coat of the same materials, having a propor-

tion of dry sharp fresh water sand added to them, equal to that of the chalk, was laid over the first in the same manner, and about the same thickness, which completed the roof, and rendered it perfectly impervious to water. The parapets are lined with a coating of the same composition, laid on in the same manner, as high as the coping stones.

The slates are used in this method, because the composition is found to adhere with more tenacity to them, than to most other substances, while on the other side the mortar binds them down firmly to the battens, so as to make the whole strong and secure. The method of boiling the composition to the proper consistence, is the chief art in the process; it is only to be acquired by experiment, and its state is judged of by the workmen by feeling a portion of it with their fingers; but they find the usual difficulties which occur on such occasions, of communicating their sensations, so that we must look to other sources for information on this head; and any one who wishes to use this method of roofing, where workmen who are acquainted with it are not to be procured, would do well to try several small experiments to ascertain this matter to his satisfaction before he proceeds farther: but in this part of Ireland such experiments will not be necessary, as it would be cheaper and better to employ Mr. Daniel Gillmore of Lisburn, who formed the roof described, to superintend the business required, than to risk spoiling the whole.

Mr. Gillmore, besides the above roofs, did the valleys of a dwelling house and the roofs of two large bow windows, in the same manner, for Robert Williamson, esq. of Lambeg, in 1808; the valleys of the house of Mr. Wm. Simms of New-grove, near Belfast; those of Mr. Nelson of Malone; those of Mr. Hunter, of Lisburn, and of several others belonging to various other gentlemen.

On all these occasions the composition has been found to be equally impervious to water as lead is, while it is much cheaper, and easier to be repaired, if it meets with any accident. Mr. Gillmore lays on this composition and roofing, at one shilling per square foot when tar is fifty shillings per bar-

rel; for which he finds tar, chalk, mortar, slates, labour, and the necessary utensils; and he charges more or less proportionally according as the tar is cheaper or dearer than the above price.

The cotton mill above mentioned is intended to be fitted up in a very complete manner; it is to have all the different floors heated to a due temperature by steam pipes; care has been already taken for its due ventilation, and to provide such accommodations for the work-people as will keep the building perfectly sweet and wholesome, and promote cleanliness. And the whole is to be illuminated by gas lights, in the same manner, as the mills of Messrs. Phillips & co. of Manchester, and several others in England are now lighted. The work is likely to be very creditable to its proprietors, as well as to Mr. Horatio Barton of Manchester, under whose management it has been planned and erected; but when the whole is completed, a further description of it will be given, as it promises to be one of the most perfect establishments of the kind in this kingdom.

A few observations on this method of making roofs, shall now conclude this paper. To the best of the recollection of the writer, the composition was the invention of Lord Stanhope, and some houses in England were roofed according to his plan; something has been published on this subject by his lordship, and when it can be procured, an abstract of it shall be given.

Flat roofs have been in use in Asia from the earliest times, and frequent allusions to this circumstance are made in the bible, as well as in the works of most Eastern writers. It has been hitherto generally understood that the quantity of snow, and rain, which fall in most parts of Europe would render flat roofs unadvisable for our climate. But this is probably a mistaken opinion, and has been caused chiefly by a good and cheap method of making them not having been generally known; a proof of which is, that many of the roofs of old churches in England are nearly flat, which have been covered with lead; so that if their flatness was any inconvenience it must have been known before this

Flat roofs are likely to be subject to still less objection in Ireland, than in England; because the quantity of snow, which falls here in general, is so much less, that there can hardly ever be any danger of its accumulating so as to do them any injury by its weight.

In large cities where ground is scarce and dear, flat roofs would be peculiarly commodious, and add much to the comfort and health of the inhabitants; affording them an additional surface, for all the uses to which yards are applied, equal to the area of the space occupied by all the houses; which in London, for example, on a rough estimate could not be less than the prodigious surface of four or five square miles.

Flat roofs would, besides affording all the convenience of yards, be preferable to them for many purposes; from their being more exposed to the sun and wind, cloaths could be dried on them better than below: and the same circumstances would render them more favourable to those little plantations of flowers, which most citizens delight in rearing; though from the want of proper light and ventilation in the confined situations, where they are at present placed, they seldom thrive with any vigour, and require constant renovation of their ranks from the country to prevent utter extinction. Some may think this consideration trifling, but a more mature reflection might convince them, that no innocent amusements should be despised, especially when they contribute to health, and the recreation of the mind, as well as to the gratification of the senses.

In making the composition for flat roofs, coal tar should certainly be tried, there is no apparent reason why it should not do as well as pine tar, and it would cost much less.

In point of economy also, roofs of Tarras composition, and of the artificial puzzolana, which has been described in a former number of this magazine, should also have a fair trial; for if they succeeded, they would form a much cheaper covering for houses than any yet mentioned.

Flat roofs also cause a great saving of timber in buildings of a certain size, such as that of the cotton mill

mentioned, for in them the place of the heavy frame work, which would be necessary to support common roofs, is supplied by beams alone; and though the rafters must be somewhat larger for flat roofs, yet as on the other hand, so much fewer of them will be required, as the breadth of the roof is less than the sum of the two sides of a roof of the common kind necessary for the same building, it is imagined that even for them considerably less timber will be required: and to buildings of all sizes, both small and great, this latter consideration is universally applicable. J.W.B.

A method of preparing Aromatic Vinegar; by Mr. J. Jennings.

Take of common vinegar any quantity, mix with it powdered chalk, or common whiting, sufficient to destroy the acidity. Then let the white matter subside, and pour off the insipid supernatant liquor;—afterwards let the white powder be dried, either in the open air, or by fire. When it is dry, pour upon it sulphuric acid, as long as white acid fumes continue to ascend. Stone vessels are the most proper to be used on this occasion, as the acid will not act upon them. The product is the *Acetic Acid*, known in the shops by the name of Aromatic Vinegar. If any one is desirous of obtaining the acid in a liquid state, the apparatus of *Nooth* presents a convenience for the purpose. It must of course be collected in water.

*Remark....*Mr. Jennings proposes the above process as an useful and commodious one for purifying prisons, hospitals, and houses where contagion is presumed or suspected. The white acid fumes diffusing themselves quickly around. From which it should appear that he either has not heard of the superior efficacy of the fumigations of oxygenated muriatic acid, of nitric acid, or even of muriatic, for these purposes, which have been so fully proved, in so many various instances, and accounts of the great and indeed surprising powers of which have appeared in so many publications, that it seems very unaccountable, that Mr. Jennings should not